

Property is the fruit of labor; property is desirable; is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise. Let not him who is houseless pull down the house of another, but let him work all day and build one for himself. Give, for example, knowing that his own shall be safe from violence when his neighbor's is.

GENERAL

ALPHABETICAL AND ANALYTICAL

INDEX

TRANSACTIONS OF THE
AMERICAN INSTITUTE OF MINING
ENGINEERS

Volumes I — XXXV
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PREFACE.

The great additional value given to professional books by adequate alphabetical and analytical indexes has been recognized from the beginning in the publication of the *Transactions* of the American Institute of Mining Engineers. The first ten volumes, edited by Dr. Thomas M. Drown, the secretary, were provided with indexes, as well as tables of contents. Moreover, he included in Vol. V. (published in 1877), a consolidated index of Vols. I. to V., inclusive; and, at the time of his resignation in 1884, he had prepared a similar index of Vols. I. to X., inclusive, which was published in the following year.

The indexes of the annual volumes from Vol. XI. on were made much more extensive than their predecessors. Casual mentions, as well as important discussions, were included; the geographical localities of mines or works alluded to in the text were added in the index; and numerous cross-references were introduced, with the purpose of making it easy for the student to discover at once what the *Transactions* contained, either of thorough treatment or of hints and clues to further inquiry, concerning any topic, locality, or person within their scope. In order to extend the advantages of this larger scheme to the earlier volumes, a consolidated index of Vols. I. to XV., inclusive (published in 1888), was prepared by compiling the several annual indexes, and introducing additional items for those preceding Vol. XI. Vol. XX., issued in 1892, contained a similar consolidated index for Vols. XVI. to XX., inclusive; in 1897, a separate index-volume, covering Vols. XXI. to XXV., inclusive, was published, and in 1902 appeared another for Vols. XXVI. to XXX. These four indexes, for Vols. I. to XV., XVI. to XX., XXI. to XXV., and XXVI. to XXX., respectively, bound together into a book of about 950 octavo pages, have constituted for the last five years a consolidated index to the *Transactions* which they cover—with the single difference that the book had to be consulted four times, where a single comprehensive index would require to be consulted but once. This disadvantage, however, was relatively small, compared with the great convenience of finding by four trials in one book what would otherwise call for 30 separate searches in 30 books. Moreover, the possession of the one might be most useful to a student who did not possess the 30, by indicating to him what they con-

tained, and thus enabling him to make further inquiry without fruitless labor. To this feature of value in such indexes, I shall presently recur.

The usefulness of the compound four-fold index referred to, is proved by the fact that the supply of copies has been exhausted. In view of this foreseen event, it was decided to issue, instead of the customary additional five-year index, a complete consolidated index of Vols. I. to XXXV., inclusive, which should take the place of all preceding ones; and Miss L. E. Howard, the accomplished and indefatigable librarian of the Institute, has been for more than two years engaged, with competent assistance, upon this laborious task. The result, embodying a compilation of the former index volumes and the annual indexes of Vols. XXXI. to XXXV., inclusive, with numerous corrections, improvements in classification, additional cross-references, etc., is the present book, concerning which I desire to offer the following comments:

1. That this Index is absolutely free from error, it would be ridiculous to assert. The atmosphere of an office and library crowded with daily visitors and overwhelmed with daily routine work does not permit such careful, intense, and minute revision as technical perfection requires. While many errors contained in our former indexes have been detected and corrected in this one, some have doubtless been brought forward into it. In this respect, I beg (though I hope it is unnecessary) to say, that with regard to this, as to every other, publication of the Institute, our rule and practice is, to be grateful, not annoyed, when we receive notice of an error, and to acknowledge and correct, not hide or ignore it. Notice of any errors discovered in this book is therefore earnestly requested.

2. It would be likewise unwarrantable to claim for the present Index a complete and consistent logical arrangement. Indeed, I am disposed rather to assert for it a higher merit—namely, that of a method more elastic than any fixed system. The controlling purpose has been to make sure that the reader, seeking either the name of a mine or process, or the forgotten title of a paper or its author, or, on the other hand, desiring to be put upon the track of an inquiry concerning something which may or may not be mentioned in the *Transactions*, and wishing to be positively assured as to that point, before looking elsewhere, shall be satisfied as quickly as possible. Hence, in the construction of our index, we put ourselves in the reader's place, and often introduce a cross-reference not logically required by the text, because it may help him, if he

has forgotten the term actually employed in the *Transactions*. In short, we make the index, not a mere concordance of words, but also a dictionary of topics and ideas. And, as to any proposed cross-reference, our rule is, "When in doubt, put it in!" For it cannot harm anybody, and it may help somebody.

The result of this system, if system it can be fairly called, has been, I know, that many members of the Institute have formed the habit of going first of all to the Index of our *Transactions*, sure of learning at once, and without troublesome search, whether and to what extent these volumes can aid them in any investigation they are called to make. I need not emphasize the folly of publishing, in these days, books on technical subjects without alphabetical indexes—a sin for which the most elaborate table of contents does not atone, and which, having repeatedly brought its own punishment, has well nigh gone out of fashion, as unprofitable sins are wont to do. But I may be permitted to express my surprise that so many editors and publishers of books intended for permanent reference, having taken the trouble to make indexes, do not take the small further trouble of making them adequately, abundantly—even unnecessarily and ostentatiously—full. There is no better recommendation of such a book to the potential purchaser, because there is no equal guaranty of its continued value to the actual purchaser. Practical men look to books for aid in the form of energy given or saved to them. Now mv^2 is the formula for energy; and in this case m is the information wanted, and v is the speed with which it can be obtained. In other words, m represents the value of the text of a book, and v the effective aid furnished by the index; so that the permanent usefulness of the book is represented by the text, multiplied by the square of the index! This may be questionable mathematics, but it is unquestionable experience, as the practice of nearly half a century qualifies me to declare.

3. Comparatively few of the members of this Institute possess complete sets of its *Transactions*. The number of such complete sets remaining on hand is very small indeed. The volumes have never been stereotyped, and it is not likely that any of them will be reprinted. The Institute maintains, at more than a hundred important mining centers throughout the world, free sets of its *Transactions*, open for consultation without fee, to all suitable applicants. This list cannot well be increased. If this new consolidated Index of 35 volumes would be useful only to those who possess, or may hereafter possess, all of those volumes, the large

cost of its preparation and publication would involve a most unwarranted and foolish outlay. I wish, therefore, to urge upon all students and practitioners, whether members of the Institute or not, the following considerations concerning the special value of this Index to those who have not the volumes themselves.

Indeed, in a certain sense, such an index is more useful to the non-possessor than to the possessor of the books. For the latter can, at the cost of some extra labor, find out what each volume contains, whereas the former, having at hand neither books nor index, is utterly ignorant whether the *Transactions* could help him or not. I often receive letters from members thus situated, inquiring what our *Transactions* contain on this or that subject; and while I do my best to satisfy them, I cannot be sure that my hasty search is complete and conclusive; and I am obliged, whenever practicable, to refer them to some library containing the volumes, and bid them do their own hunting. But, on the contrary, if a member, finding in the Index the title of a paper, or the record of any remarks, concerning a subject in which he is interested, writes to the Secretary concerning it, I can easily, and always do gladly, tell him in reply what is the nature, length, etc., of the said passage; whether we can furnish it to him in separate pamphlet form, etc.—these being particulars which my clerks can ascertain for me at once. Moreover, members of the Institute send me, not infrequently, valuable professional papers, in which previous contributions to the *Transactions*, directly or indirectly dealing with the same subjects, are ignored. It is my theory that the author of an Institute paper should recognize what his fellow-members have done before him in the same line. Of course, if he fails to do this, it is because he does not possess the back-volumes of our *Transactions*, and is not acquainted with their contents. It is the duty of the Secretary to call his attention to this omission; and the result is not only extra labor for the Secretary, but often also some unnecessary mortification to the author, who is obliged to recast his paper in the light of the new information furnished to him. All this would be avoided, if the author had at hand simply an Index of the *Transactions*, upon the consultation of which he could have obtained from the Secretary, in advance, both guidance and aid.

4. But there is another and more important reason for recommending to all mining engineers, metallurgists, etc., whether members of the Institute or not, the acquisition of this volume. Namely, the issue of it by the Institute is part of a plan, the full realization

of which is scarcely yet in sight, while every step towards its complete accomplishment is, in my judgment, to be regarded as an essential gain.

As is well known, the generosity of Mr. Andrew Carnegie, for many years a member, and now an honorary member, of this Institute, has provided for the Institute, together with the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, the magnificent building in which our headquarters are now permanently located. One consequence of this arrangement is that the libraries of the three societies are accommodated together in the 12th and 13th stories of the building. These libraries, aggregating more than 50,000 books, pamphlets, etc., comprise perhaps the best record of modern engineering practice in the departments of the three societies which can be found in the United States—for specifically American practice, perhaps the best in the world. At the present time, they are separately owned and administered by the three societies; but, so far as their use is concerned they constitute practically one library, to which the members of each society, and others properly introduced, have free access. We hope, by means of indexes and catalogues, to extend this advantage to members at a distance, who may thus be enabled to consult books and periodicals by correspondence, to obtain copies of text and drawings, etc. Towards this end, the issue of the present Index is an important step.

R. W. RAYMOND,

Secretary.

NEW YORK, September, 1907.

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ERRATA.

The following list of corrections has been compiled from the thirty-five volumes, with some additions:

VOLUME I.

Page 160. The first two sentences of the second paragraph should read as follows: "For No. II we find that 2.33 per cent. Al_2O_3 take 4.07 per cent. SiO_2 , leaving 3.48 per cent. SiO_2 free, which requires 3.25 per cent. CaO ."

Page 160, line 14, 3.79 should be 3.25; and in the 15th and 18th lines, 46.44 should be 46.98.

VOLUME VI.

Page 59. The discharges of the miners' inch per second, given as .2624 and .2499 cubic feet, should be .02624 and .02499, respectively. The discharges per minute, hour, etc., are correctly given.

VOLUME VIII.

Page 214. 16th and 25th lines, ferric carbonate should be ferrous carbonate.
Page 486, 16th line, 10,000 should be 5,000.

VOLUME IX.

Page 17. At the end of the first sentence of the third paragraph, feldspathic hematites should be feldspathic magnetites.

VOLUME X.

Page 104, 10th line, sulphides should be sulphates.

VOLUME XI.

Page 191, footnote, September should be August.

VOLUME XV.

Page 133, 12th line from bottom, water should be waters; 5th line from bottom, 1869 should be 1864.

Page 134, 20th line, cut should be cuts.

Page 437, 6th line, "times proportioned" should be "times inversely proportional."

Page 779, 9th line, after "breaking load of Fig. 3" insert "for 24 inches span."

Page 804, at the end of the second paragraph, the fraction $\frac{Md}{2I}$ should

$\frac{Md}{2I}$
be —.
2I

VOLUME XVI.

Page 799, the number of geysers in the Upper Basin should be stated, as the context shows, at 49 instead of 40.

Page 807, line 16 from the bottom, introduce "through" after "circulate."

Page 835, line 8 from the bottom, for "form" read "forming."

Page 855, last line of table, the cost of wire to transmit 500 horsepower for 100 miles should be \$100,000,000, instead of \$40,000,000. The remainder of this table, and also the calculation below it, on the same page, are affected by the correction, and should be changed accordingly.

Page 912, line 2, Marysville, should be Murphysville.

Page 915, line 22, minimum should be maximum.

VOLUME XVIII.

Page 336, line 7 from the bottom, microscopic should be macroscopic.

Page 340, line 15 from top, are should be are not.

Page 340, line 11 from bottom, microscopically should be macroscopically.

Page 341, line 12 from top, circular should be acicular.

Page 347, line 13 from bottom, antimony or should be antimony as.

Footnote, page 529. Composition of Various Commercial Aluminums. Mr. A. E. Hunt desires to say that samples of metal recently received from the Aluminum-Industrie-Aktien Gesellschaft (works at Neuhausen, Switzerland, and Froges, Southern France), have been analyzed by Mr. Hendy, chemist of the Pittsburgh Testing Laboratory, with the following results:

	Fe.	Si.	Cu.	Pb.	K.	Al.
I.	0.03	0.53	none	none	none	99.44
II.	0.03	0.52	none	none	none	99.45

This company should, therefore, be added to the list of four given on pages 528 and 529; and a further addition is now required, namely, that of the Metal Reduction Syndicate, Limited, the works of which are at Patricroft, near Manchester, Eng.

Page 673. Analysis of Aluminum-Bronze. Dr. Simonds desires the statement to be added that the determinations of Al in this table are "by difference."

VOLUME XXI.

Page 60, line 7 from bottom, for *Loddy* read *Soddy*.

Page 566, in the sub-title to Prof. Hall's paper, for *October* read *June*.

Page 572, names of Regents' Standing Committee on the State Museum, should read, the *Lieutenant-Governor*, the *Superintendent of Public Instruction* *William L. Bostwick*, *Daniel Beach*, etc.

Page 577, line 16 from top, for *granite* read *conglomerate*.

Page 577, line 22 from top, for *east and north* read *west*.

Page 577, line 8 from bottom, for *limestone* read *limonite*

Page 583, line 6 from top, for 80 to 90 read 60 to 70.

VOLUME XXII.

Page 15, lines 13, 14 and 20 from top, for Fe_2O_3 read Fe_2O_3 .

Page 117, in table of analyses, for the percentage of carbon in the interior of Martin boiler-plate, No. 5, for 0.0028 read 0.280.

Page 118, line 4 from bottom, for *shortage* read *shrinkage*.

Page 321, line 15 from bottom, for *betimes* read *at times*.

Page 324, line 6 from top, for *height* (of the stamp) read *weight*.

Page 328, line 2 from bottom, for *R. N. Terhune* read *R. H. Terhune*.

Page 329, line 6 from bottom, for *Hoffman* read *Hofmann*.

Page 335, line 10 from top, for *Crook* read *Crooke*.

Page 337, lines 5 and 16 from bottom, for *Matheson* read *Mathewson*.

Page 631, line 2 from top, for *Ratsbech* read *Ratsbeck*.

Page 654, line 16 from top, for *silver-mills* read *some silver-mills*.

VOLUME XXIII.

Page 193, line 7 from bottom, for .0019 (the conductivity of wrought-iron at 0°) read 0.019.

VOLUME XXIV.

Page 76, in the engraving of coal-sections in Wise county, Va., for *Seam*, 8 ft., *Coal* 7 ft. 11 in. (the totals under Section 21) read *Seam*, 7 ft. 11 in., *Coal*, 7 ft. 8 in.

Page 582, line 5 from top, for *Refining Company* read *Rolling Company*.

Page 897, line 16 from bottom, for *dolomite* read *limestone*, and for *limestone* read *dolomite* (the percentage of sulphur being 0.125 in the limestone and 0.0645 in the dolomite).

VOLUME XXV.

Pages 118, 120, 126 and 127, for *Ramsey* read *Ramsay*.

Page 148, in map, for *Atlantic Ocean* read *Pacific Ocean*.

Page 670, line 9 from bottom, for *Randolph county* read *Davidson county*.

Page 682, line 5 from top, after *Montgomery* read (now in *Stanley*).

Page 686, line 8 from top, for *Randolph county* read *Montgomery county*.

Page 718, line 8 from bottom, for *Thompson* read *Thomson*.

Page 751, line 13 from bottom, for *Blackmore* read *Blackmer*.

Page 987 (footnote). The modulus of rupture of a hexagon bar, as here given, is incorrect. It should be 2.51 S. The error is stated and corrected in the continued discussion of "Physics of Cast-Iron," printed in vol. xxvi. In the second paragraph of this footnote, for 2 by 3 by 12 inches read 2 by 2 by 12 inches. The modulus of rupture here given is correct.

VOLUME XXVIII.

1. See Errata of vol. xxix.
2. Page 895, line 20, *antimony* should be *tin*.
3. Pages 832 and 835, certain work is credited by Prof. H. M. Howe to "Mr. Dean," which was done by Mr. Allan Gibb. See Prof. Howe's correction on page 1133 of vol. xxx.

VOLUME XXIX.

1. Page xxxviii, the title "Notes on the Operation of a Light Mineral Railway," etc., is erroneously included among the papers of the New York meeting. This paper was read at the Buffalo meeting, September, 1898, and is printed in vol. xxvii, p. 600.

2. Page 901, Mr. H. B. Edwards is called the manager of the Mountain Copper Co., at Keswick, Cal. On page lxvii of the same volume Mr. Edwards is correctly mentioned as assistant manager.

VOLUME XXX.

Page xlviii, the list of papers read by title at the Canada meeting should contain the paper of Mr. J. B. Davis on "The History of Solar Surveying Instruments," which is printed on pp. 803-837.

Page 711, footnote. The second analysis should read 41.37; 57.27; 0.58; instead of 41.56; 57.79; 0.65.

Page 713, second footnote. For "petzite" read "a yellow telluride (kremersite or calaverite)."

VOLUME XXXI.

Page 1051 (Index), between the eighth and ninth lines from bottom of page insert "Blake, W. F., The Caliche of Southern Arizona: An Example of Deposition by Vadose Circulation, 220 *et seq.*"

VOLUME XXXII.

Page 399, line 14 from bottom, "8 miles" should be "15 miles."

Page 399, last line, "50 to 75" should be "350 to 400."

Page 400, line 16 from top, add "The veins strike N-S and dip from 45° to 75°."

Page 400, line 10 from bottom, "Alfreina" should be "Alfreña."

Page 400, line 5 from bottom, substitute "The larger veins can be traced 3 or 4 miles."

Page 401, first line, substitute and add so that the first sentence (beginning at the bottom of p. 400) will read: "The ores consist of lead and zinc sulphides and carbonates in quartz gangue. Rich gold- and silver-ores occur in the oxidized portions of the veins. Below water-level the gold-values are smaller and the silver-values more constant."

Page 401, line 12 from top, "A 60-ton mill" should read, "a mill producing 50 tons of concentrates daily."

Page 401, line 14 from top, "Alfreina" should be "Alfreña," and the mention of Palo Blanco mine should be struck out.

Page 401, line 15 from top, "the product" should be "some of the product."

Page 401, line 20 from top. This line should be struck out, and the next should read, "The Moctezuma," etc.

Page 401, line 13 from bottom, "250-ton" should be "200-ton."

VOLUME XXXIII.

Page 727. The quantity 140,000,000 lb. is obviously a clerical error. It should be 14,000,000 lb., the actual production of copper reported officially by the Greene Consolidated Copper Co. for the year 1901 being 13,854,170 lb.

VOLUME XXXIV.

Page xxviii. W. F. Stevens is erroneously reported deceased.

Page 109. Title of Fig. 1, "Naticoke," should be "Nanticoke."

Page 902. Footnote reference ¹⁵, add the date Feb. 19, 1903.

Page 903. Footnote reference ¹⁷, add the date Feb. 19, 1903.

Page 906. Bottom of Table II add:

Ounces fine gold =	3352.6
--------------------	--------

Ounces fine silver =	1400.
----------------------	-------

Total ounces doré bullion =	4752.6
-----------------------------	--------

Cost of refining per ounce doré bullion.....	\$0.0984
--	----------

Page 907. Bottom of Table III, replace

Total ounces bullion.....	1567.6
---------------------------	--------

Cost per ounce bullion.....	\$0.221
-----------------------------	---------

by

Ounces fine gold =	914.
--------------------	------

Ounces fine silver =	680.
----------------------	------

Total ounces doré bullion =	1594.
-----------------------------	-------

Cost of refining per ounce doré bullion.....	\$0.217
--	---------

Page 917, line 26, "iron-ore and silica" should be "suitable fluxes."

Page 917, line 27, after the words "from which the lead separates," add
 "This slag would have to be rerun in a shaft-furnace in order to recover lead
 and small values of gold and silver."

Page 959. In table, top of page, under column 4 (arsenic), 0.011 should
 be 0.110.

Page 1014. Le Doux should be Ledoux.

VOLUME XXXV.

Page 115, line 27. For "Die Briquette Industrie" read "Die Brennmate-
 rialien."

Page 116, line 39. For "Briquette Industrie" read "Die Brennmate-
 rialien."

Page 397, line 5. For "Baltimore meeting" read "Atlantic City meeting."

Page 447, line 9. For "carbonic dioxide" read "carbon dioxide."

Page 533, line 25. For "Yankie" read "Yankee."

Page 811. Add to title "(Lake Superior meeting, September, 1904.)."

Page 856, line 9. For "from" read "form."

Page 1004, line 3. For "dust and all" read "all but the dust."

Page 1004, line 38. For "from 1-3 to 1-16" read "from 1-32 to 1-16."

GENERAL INDEX.

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[NOTE.—In this Index the names of authors of papers are printed in SMALL CAPITALS, and the titles of papers in *italics*. References to papers expressly treating of the subject named are likewise in *italics*; and casual references, giving but little information, are usually indicated by bracketed page-numbers.]

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